Growth Management Studies: 1

BUSINESS AND INFORMATION TECHNOLOGY PLANNING: GENERAL APPROACH AND METHODOLOGY

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of
Revenue

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SUMMARY OF STUDIES 1 AND 2

STUDY 1

TECHNOLOGY PLANNING & INVESTMENT

General Approach & Methodology

Principles & Business Practices
Strategic Direction & Co-ord'n
Program Plng & Project Mgt
Life-Cycle Mgt & Reviews
Human Resources Planning
Role of Internal Auditor

STUDY 2

END-USER COMPUTING TECHNOLOGY

Purpose, Principles & Approach
Need for EU Technology Strategy
End-User Training & Support
EUCT Policies & Standards
Data Management & Security
Finance and Integration

PREFACE

Since the mid-1970s the Ministry of Revenue has invested heavily in information technology to deal with workload growth and new programs in the face of continued budgetary constraint. This has involved the preparation of an ongoing sequence of business plans and associated investment requirements. An important part of this process was an assessment of how our planning and management practices should be strengthened to command the increasing mass and diversity of installed systems and to exploit new technological opportunities.

Also, in 1984 the Technology Directions Committee of Deputy Ministers commissioned a series of studies by ministries as part of the development of an overall Information Technology Strategy for the Government. This is one of two studies undertaken by the Ministry of Revenue.

Our mandate in this study was to demonstrate a general methodology for integrating business and technology planning and management, based on commonly accepted principles and 'best practices'. Our second study deals with the particular requirements of an investment strategy involving rapid expansion of end-user computing and communications systems.

Originally published in 1984 and 1985, the studies have been reprinted for continued use within Revenue and to fulfill external requests for copies. In so doing, they have been edited, hopefully, to improve their clarity, and revised to reflect some of our recent experiences in technology management. However, information technology is a fast changing field and we have chosen to defer a number of newly emerged issues and developments for fuller treatment in forthcoming studies. In the meantime, we believe the basic principles and methods described in Studies 1 and 2 remain valid.

In revising these studies, we were helped by many colleagues in the Ministry of Revenue. Foremost among these were Mary Proc, then Executive Assistant to the Deputy Minister and now Director, Taxpayer Services Branch; John Randolph, Executive Director, Information Technology Division; Fred Stephens, then Acting Assistant Deputy Minister, Tax Revenue and Grants Program; and Ed Farragher, Director, Personnel Services Branch; David Stones, Director, and Cathy Neal, Communications Assistant, Communications Services Branch.

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PART A: FOUNDATIONS AND PRINCIPLES

CHAPTER I: INTRODUCTION AND APPROACH

The purpose of this study is to advance a general methodology for planning and managing information technology investments, in direct support of an articulated set of business development objectives.

The paper is written primarily for ministry executives and program managers who are not themselves information systems specialists, but who are responsible for establishing investment strategies and approving projects, and are accountable for achieving planned business results.

A. THEORIES AND PRACTICES

Recent years have seen a dramatic acceleration in the supply of competitive products across the full spectrum of information technology (I/T). One salient feature of this 'technology explosion' is the proliferation (and short shelf-life) of fashionable prescriptions of how to exploit and control technology for profit and fun.

In contrast with the confidence and elegance of management theories are the decidedly pragmatic ways organizations, by accident or design, manage technology in practice. In short, empirical observation and experience provide ample warning that there are no universal and proven methods which can be applied with textbook certainty among diverse organizations.

More recently and to their credit, some writers have recognized the dangers of undue reliance on highly formalized management structures and procedures. Instead, they have emphasized the importance of such entrepreneurial qualities as business savvy, initiative and staff motivation. While the writings on managerial 'excellence' rarely amount to more than generalized exhortations to do well, they are at least encouraging in stressing the need to provide on-site managers with the support and freedom they require to bend technology to their business needs under imperfect conditions.

B. THE MANAGEMENT OF DIFFERENCES

In terms of size and diversity, the Ontario government is comparable to a large industrial sector. Operationally, its numerous ministries and agencies are better characterized by their differences than by their similarities. Indeed, their basic rationale is that they provide the means by which a largely heterogeneous assortment of programs can be divided into manageable groups, in much the same way as large industrial conglomerates comprise diverse subsidiary enterprises.[1]

We contend, therefore, that any general 'Information Technology Strategy' for the government must accommodate, and indeed encourage, differences in the ways ministries use and manage technology. Accordingly, we have argued elsewhere that the reconciliation of central agencies' and ministries' interests requires new forms of results-oriented contractual relationships.[2]

1. At the Government Level

It is commonly agreed that the present mass of administrative directives governing ministries' use of I/T should be rigorously culled and simplified to achieve a better fit between the essential requirements of accountability and operational flexibility. In particular, the processes by which ministries' plans and choices are approved should be revised to purposely speed up the exploitation of information technology across the service.

2. At the Ministry Level

In return for more tactical freedom, however, it is reasonable that ministries should be expected to demonstrate their ability to plan and manage investments effectively without step-by-step scrutiny.

The fact that the range and complexity of I/T systems varies greatly among ministries suggests that they should be treated differently, at least initially. The objective should be to allow experienced ministries to press on

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1. See George Bell and Andrew Pascoe, The Ontario Government: Structure and Functions (Toronto: Way & Thompson, 1988).

2. See T.M. Russell, "Challenges and Promises of Technological Innovation", 18th National Seminar, Institute of Public Administration , Toronto, October 1985.

with minimum supervision, and to assist others to acquire the expertise necessary for more ambitious levels of activity.

Under this approach, the treatment of ministries would depend on their ability to meet common standards of competency, such as:

- **Clear Business Plans and Objectives:** "Can the ministry demonstrate exactly what it wants to achieve with I/T in terms of improving its program deliveries and operational efficiency?"

- **Coherent Long-Range Technology Strategies:** "Does the ministry know where it's going in terms of a viable 'architecture' governing systems selections, development and co-ordination?"

- **Effective Management Base and Practices:** "Do they know how to direct, finance and manage investments through all stages of planning, implementation and life-cycle operations to achieve planned results within stated cost limits?"

- **Sound Track Record:** "Are their claims and plans supported by convincing and sustained past successes?"

Alternatively, those ministries which are less advanced technologically would be required to observe a fuller set of 'training rules' concerning product selections and project approvals. In such cases, however, the weight of scrutiny should be tempered by substantial central assistance in building the bases for greater independence.

C. APPROACH

The basic premise of this study, therefore, is that each ministry must go through the process of constructing technology planning and management practices to fit its own business requirements and operating circumstances. While this process will inevitably vary among ministries, we summarize it as involving two stages.

First, we describe in Chapter II how a ministry might usefully review its past performance in using information technology, as a necessary basis for:

- assessing the need to strengthen its ability to plan and manage technological change; and

- establishing business targets for future investments.

In Chapter III we suggest that each ministry should also enunciate a set of general principles which will govern the introduction and use of information technology, and which will provide a common understanding of the responsibilities of executives, managers and staff.

Our second stage involves how a ministry might then proceed to strengthen its technology management capacity. In Chapter IV we present a summary model of an integrated approach to business and technology planning and management, the parts of which are explained in greater detail in subsequent chapters in Part B. The purpose of our model is to identify the essential practices and functional relationships of a 'complete' planning and management sequence.

Finally, Part C contains appendix notes on two additional components of technology management: namely, human resources planning; and the role of the Internal Auditor in verifying the business and operations viability of investment decisions.

D. EMPHASIS ON FLEXIBILITY

This paper is not a manual of technology administration. Nor is our model intended to prescribe exactly how ministries should conduct their technology business. As we have already stated and will emphasize throughout, management practices and processes must be flexible.

- **Flexible Organization:** Each ministry should be allowed to decide how best to organize its technology business. (Indeed, technology management may vary significantly in form and intensity within a ministry to reflect differences among constituent programs.)

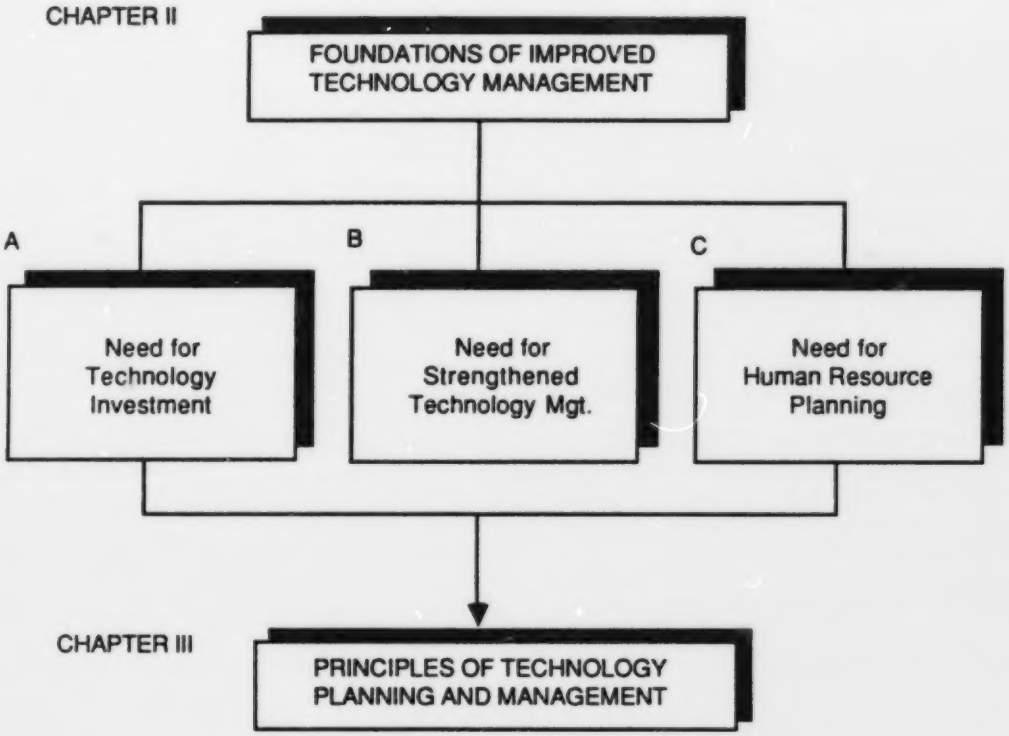
- **Flexible Compliance:** Managers should be encouraged to exercise professional judgement in following rules. With training and experience, observance of the essential

requirements of mandated practices should be instinctive rather than a matter of 'by-the-book' regimentation.

- **Flexible Application:** Similarly, the time and effort given to proofing investments should always be proportionate to their size and complexity. Expensive multi-stage projects require more attention than small standalone applications. Projects should not be 'studied to death'.

Finally, we maintain that the ultimate test of any management system is the achievement of planned results. Stripped of its structural complexities, our model contains a core of 'best practices'. If these are accepted as necessary for success it is reasonable that ministries should be expected to demonstrate their fulfillment in substantive terms, as a basis for Management Board approving their strategic plans and exempting individual projects from detailed supervision.

Diagram 1:1 FOUNDATIONS & PRINCIPLES



CHAPTER II: FOUNDATIONS OF IMPROVED TECHNOLOGY PLANNING AND MANAGEMENT

The question of *how* a ministry should strengthen its planning and management capacities presupposes it knows what it *wants* to achieve through information technology. In this chapter, we decribe the steps by which a ministry might usefully assess its present use of technology and delineate future needs and actions.

As shown by Diagram 1:1, we shall identify three foundations of successful technology planning and management (TPM).

A. THE NEED FOR TECHNOLOGY INVESTMENT

The common driving force among Ontario ministries for investing in I/T is the need to deal with program growth and changes within restricted budgets and staffing levels. The objective is to 'do more with less' by using technology to increase productivity.

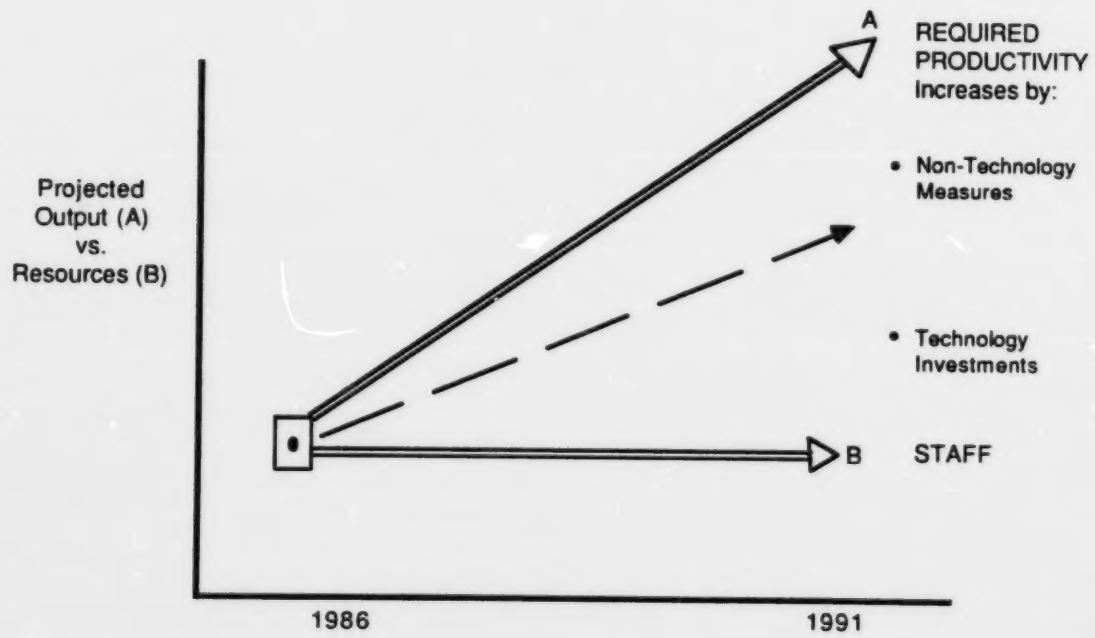
The first foundation of effective TPM, therefore, is a clear understanding of the role of technology in achieving the ministry's business objectives, as a basis for establishing a set of productivity targets through, say, a five-year planning period. This process consists of two steps.

1. Business Development Plans and Targets

When we were formulating Revenue's technology investment plans for 1985-90, all Program Groups and constituent branches went through an extensive exercise of reviewing their operations and setting long-term business goals.

- **Current Operations.** "How good are we now? How must we get better?" This entailed identifying production backlogs, resource shortages and customer service requirements, etc., as

Diagram 1:2 REVENUE'S DEPENDENCE ON TECHNOLOGY TO INCREASE PRODUCTIVITY



revealed by a variety of quantitative and qualitative performance indicators.

- **Future Business Goals.** "What more must we achieve next year and in the following 3 to 5 years?" in terms of:

  > projected growth in basic workloads, and increases in complexity;

  > emerging priorities, and new client groups; and

  > scheduled program changes and upgrades, and possible new programs.

2. Investment and Productivity Targets

The next step concerned the scale and form of the effort required to achieve Revenue's immediate and longer-term business objectives. In terms of our assumption that we could not expect commensurate funding increases, this involved the question of how we could use I/T to change business methods to economize scarce staff resources and increase productivity.

First approximations of required productivity increases were calculated by commonly accepted analytical techniques. Diagram 1:2 illustrates the approach we used to establish the broad magnitude of required productivity gains, at the ministry level, over the planning period. (Similar scenarios were also constructed for each Program and its member branches.)

These projections were important because they showed that the accumulated impact of even modest annual growth rates yielded significant productivity requirements when set against our assumption of severely restricted staff levels. The scenarios were, then, useful in focusing the attention of Revenue's management and staff in four important ways:

- They provided forceful demonstrations of the ***strategic importance of I/T*** in achieving our long-term business objectives and commitments.

- They demonstrated that the achievement of ***significant productivity gains required sustained effort and success*** every year in the planning period.

- Since I/T cannot be applied immediately and evenly to all parts of the ministry, the summary scenarios also demonstrated the importance of ***applying I/T as fast as possible on the broadest possible front.***

- Finally, since even maximum use of technology opportunities could not be expected to fill the 'productivity gap', they stressed the importance of ***improving program and resource management generally.***

B. THE NEED TO STRENGTHEN TECHNOLOGY MANAGEMENT

Once we had established the importance of I/T in achieving required productivity gains, the second foundation involved an assessment of how we should develop our TPM capacities.

1. Assessment of Past Experience and Achievements

In varying degrees, most Ontario ministries have established a base of experience in using I/T. We suggest that a dispassionate appraisal of past successes and mistakes, therefore, is essential in determining a ministry's ability to plan and control future ventures. Among the questions we addressed in Revenue were:

- "How well have we selected and co-ordinated individual projects to meet explicit business objectives and productivity targets?"

- "Have our plans and projects been implemented on time and within budget?"

- "How good have we been at selecting and applying I/T products?"

- "How have our systems performed in terms of ongoing effectiveness, reliability and cost?"

- "How well have we prepared, trained and redeployed staff?"

- "Do we have sufficient competent project planners and information professionals? How dependent are we on consultants and contract staff?"

- "Have we identified profitable and operationally sound opportunities for future investments?"

2. New Issues and Requirements

Major and sustained productivity gains in the future, however, depend on more than simply duplicating past successes or avoiding past mistakes. As technology becomes more pervasive and functionally interdependent in a ministry, it must be capable of dealing with new choices, cost pressures and risks as installed systems and new investments become more complex.

New Applications. In Chapter I we referred to the acceleration of new I/T offerings, particularly through the downsizing of mainframes and proliferation of end-user computing and communications products. Almost inevitably, major investments in new technologies are exposed to risks of faulty product selections, design defects and policy changes.

Requirements:

- Major investments must be designed to meet stated production objectives, and subjected to rigorous pre-testing before full-scale implementations are approved.[1]

- Wherever possible, large-scale investments should be divided into discrete projects, focused on immediate payoffs and flexibility.

- In all cases, maximum attention should be given to minimizing acquisition or leasing costs of hardware.

Controlling Maintenance Costs. Often in the past, new systems were implicitly expected to last indefinitely. They were replaced or reconstructed only when they became manifestly unworkable. Also, perhaps inadequate attention was given to downstream maintenance and enhancement costs in evaluating product choices and designing new systems. By common

1. The role and conduct of Independent Reviews are discussed in Chapter VIII.

experience, however, such costs tend to increase, on an unplanned basis, with the age of systems as they are changed piecemeal to meet new program tasks and increasing workloads.[2]

Requirements:

- New systems should be planned with explicit allowance for obsolescence.
- Approval of new systems should be based on their profitability within stated life-spans, on the assumption that they will likely be scrapped and replaced by more productive ones at some expected point.
- Also, operating and maintenance costs must be rigorously controlled within pre-set limits, as part of an overall 'release maintenance' plan for each fiscal year.[3]

Controlling Processing and Communications Costs. Along with enhancement, maintenance and replacement costs, increased dependence on I/T will predictably also generate cost pressures associated with data management, processing and transmission, and security. Unless these costs are controlled, there is a distinct danger that they will outstrip a ministry's I/T budget and thereby its ability to finance new investments will decline progressively.

Requirements:

- New and replacement applications must be designed to minimize growth in processing and transmission cycles.
- Ministries should bargain rigorously to extract the lowest price possible from data service bureaux, preferably in the form of multi-year fixed-price contracts.

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2. For example, Revenue's systems are subject to a particularly high incidence of unplanned changes needed to implement annual Budget tax changes and new programs.

3. 'Release maintenance' is a process by which repairs to existing systems are subject to an explicit process of review, much like new systems. The objective is to ensure that maintenance expenditures do not grow progressively to the point where they could eventually absorb all available funds to the exclusion of new investments.

- As an alternative, attention should be given to exploiting reductions in the size and cost of mainframe processors by establishing on-site facilities.[4]

- Where transmission costs are sufficiently high to offset the economies of either in-house or off-site processing, distributed data processing alternatives should also be examined.

C. HUMAN RESOURCES PLANNING

The need for human resources planning (HRP) is based on the common understanding that the success of I/T systems ultimately depends on the motivation and skills of the people who are expected to drive them. For this reason, it is a long-standing principle in the Ministry of Revenue that technological change must be managed in ways which avoid sudden disruptions to staff and, more importantly, provide opportunities for career advancement.

As in our discussion of the first and second foundations of TPM, we suggest that an assessment of a ministry's past record is a necessary basis for improving its management of human resources in relation to future technological change. The following are only some of the questions addressed in Revenue.

1. Forecasting Staff Needs

Has the ministry been successful in forecasting staff requirements of past investments? Do we know how many skilled people will be required to support our plans over the next five years?

Requirements:

4. For many years Revenue sought to contain the growth of data processing costs for specific applications by switching work among the Ministry of Government Services and private sector bureaux on the basis of competitive cycle prices. In 1985, we obtained annual fixed prices for all of our programs run at MGS. However, after an extensive tender process, in February 1987 we obtained Management Board's approval to lease and install a mainframe processor in our Oshawa head office. This will greatly reduce our processing costs for four years. See Chp. VIII C.

- The specification of staff skills and numbers should be a mandatory part of all project plans, schedules and approvals.

- Similar attention should be given to identifying people who are potentially available for training and redeployment, as well as skill requirements for new recruits.

Have the ministry's training and career development practices been successful to date in avoiding staff disruptions, supplying skilled people and creating career opportunities? More importantly, can our training and recruiting capacities support an accelerated investment drive, in which end-user skills will become basic and pervasive requirements for job performance and advancement throughout the organization?

Requirements:

- The ministry must be prepared to invest its Personnel and I/T branches with the resources needed to provide a full range of counselling and training services.

- The ministry must determine how it can train people in the most effective and economical manner through the balanced development of in-house training capacities and use of external services.

- It must also establish how much it must invest in training facilities and equipment, and build these requirements into its financing plans and allocations.[5]

2. Working Conditions

The introduction of I/T directly into the workplace generates many questions which affect people's morale and productivity. Simply put, the conditions under which staff are expected to work with I/T are as important as selecting the right tools and training people to use them. The following are some of the issues which must be addressed as part of the design and implementation of new projects.

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5. In early 1986 we established our own Technology Demonstration and Training Centre in Oshawa to greatly increase end-user training and support. For a fuller discussion, see our "Exploiting End-User Computing Technology", Chapters IV and V. Hereafter referred to as Study 2.

Requirements:

- The introduction of I/T devices should be accompanied by space planning to accommodate new work patterns and avoid crowding.

- Workstation furniture should be selected which allows staff to use machines efficiently and comfortably. Furniture should be adaptable to individual requirements and preferences.

- Work patterns and job requirements should be planned and varied to avoid stress and strain in working with machines.

In Revenue's experience, there are three main requirements in ensuring that working conditions are conducive to people's willingness and ability to use workstation technology effectively:

- First, furniture and environmental requirements should be treated as necessary components of project design and funding.

- Secondly, because of the multiplicity of combinations in which desktop technology is used, staff should be given as much freedom as possible to decide how their space should be organized and furnished to best suit their business needs.

- Thirdly, a ministry must be prepared to provide a range of logistical services needed to meet end-users' needs and preferences.[6]

3. Incentives and Rewards

The history of western industrialization provides ample evidence that the success of technological change ultimately depends on workers receiving a fair share of the value of productivity gains. Generally, where nations and companies have observed this rule they have experienced better economic

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6. In 1983, Revenue's head office operations and 1,600 staff were moved to a new building in Oshawa which was specifically designed for the maximum use of end-user computer and communications technology. We also established a Facilities Management Unit to ensure the efficient use of space and fit workstation layouts to users' requirements. See Appendix C for Revenue's Technology Inventory in 1987/88.

growth and higher profits. Where they have failed they have been variously repaid with stagnation, strikes or revolution.

Within the Ontario government, a ministry's ability to provide productivity incentives to its people is controlled by government-wide policies. In common with many private sector organizations and other jurisdictions, Ontario's job classification and pay systems were established before the advent of end-user computing technology. More recently, however, encouraging progress has been made in allowing ministries greater scope to recognize the impact of technology on jobs, while further improvements are being developed for early delivery.[7]

Even so, government policies and rules are not our immediate concern. Whatever might be their real or perceived limitations, effective HRP remains the unavoidable responsibility of each ministry. Also, each ministry should energetically use the scope which, in fact, already exists to provide technology-related incentives and rewards. In our experience, much can be achieved before corporate rules become the only limiting factor.

Requirements:

- The ministry should declare its commitment to rewarding staff for using I/T to deliver productivity gains.
- The ministry should use whatever scope exists in classification and pay scales to achieve a convincing correlation between technological change and staff advancement.
- Specifically, all investment plans should identify the impact on staff skills, responsibilities and productivity, and include plans for warranted salary and classification increases.
- Salary rewards should be delivered within a reasonable period after new systems are fully operational and successfully delivering targeted productivity gains.
- At all costs, technological change should not result in classification and salary decreases for existing staff in the affected areas. Where job requirements are reduced, their

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7. This has occurred as a result of the establishment of the Human Resources Secretariat in the Cabinet Office in 1986 with the specific mandate to modernize policies and practices.

salaries should be protected until they can be relocated to other jobs of at least equal rank and replaced by lower-level staff.

- Finally, people must believe that equity exists in promotions. The ministry should establish effective performance and career development systems, containing clear rules and criteria. Further, staff development must be mandated as an explicit measure of the performance of all executives, managers and supervisors.

4. HRP in Practice

In this section we have been concerned with the imperative and general principles of effective HRP in support of a strategy of increased I/T investment. These principles are translated into operational form in Appendix A, which details the components and workings of a co-ordinated management system.

CHAPTER III: PRINCIPLES OF TECHNOLOGY PLANNING AND MANAGEMENT

In Chapter II we described the operational foundations of technology planning and management. However, a ministry's attitudes towards the use of technology are also important; particularly as they concern what is expected of people and, in turn, how they can be expected to be treated. In this chapter we suggest that a Statement of Management Principles would serve as a basis of understanding among participants of their roles and conduct in the process of technological change.

In the case of the Ministry of Revenue, the following principles express the importance we attach to:

- leadership, initiative and innovation;
- concern for people's needs and aspirations; and
- accountability for results among executives and managers.

1. Success and Survival

The first and last reason for investing in I/T is to increase the efficiency and effectiveness of our programs. Like all other management actions which use scarce resources it demands concentrated attention and continued effort to produce maximum and sustained results.

- *The ultimate test of technology management decisions, methods and processes, at all levels, is success.*
- *Investment projects must deliver planned productivity gains on time, within budget, and meet ongoing operating targets.*
- *Once started, a commitment to a strategy of increased dependence on I/T is irreversible. Failure means chaos.*

2. Effective Leadership

The foremost responsibility of the Deputy Minister and senior management is to give clear directions to investments, based on a common understanding of the ministry's business objectives. Their commitment must be real and continuous, and not confined to occasional 'key meetings' or panic actions when things go wrong.

- *Management processes must ensure effective executive decisions and the transmission of precise instructions to other participants.*

- *The Deputy Minister and Program Heads must be accessible, and seen to be in command and fully involved. The responsibility for failure cannot be delegated.*

3. User Participation

With a sound framework of strategic direction and support, successful exploitation of technology depends on the knowledge, confidence and skills of business and systems professionals. This dictates that 'top-down' policies and decisions must be supported by 'bottom-up' advice and intelligence on the feasibility and implementation of investment plans.

- *Senior management must ensure that management processes encourage the fullest participation of users at all stages.*

- *'Ownership' and tactical control of I/T systems should be vested in the line-branches responsible for their use.*

- *Pride of achievement should be fostered by encouraging staff to publish and demonstrate their work to their professional peers.*

4. Flexibility and Speed

Investment in I/T is inherently risky and costly. This places a premium on dividing large-scale projects into discrete, digestible phases.

- *Wherever possible users and systems staff must give close attention to maximizing payoffs as soon as possible.*

- *They must test their designs and choices throughout the investment process, and be sensitive to changing business objectives and conditions.*

5. Innovation and Initiative

While formal procedures are necessary to achieve order and objectivity in I/T strategies and projects, their purpose is not to impose regimental conformity or rigidity.

Recognition and exploitation of profitable investment opportunities under uncertain conditions also depend on the ingenuity of everyone involved, particularly among end-users and systems staff responsible for specific projects. These skills and attitudes cannot be neatly 'ordered up' or 'programmed'. They are nurtured by constant encouragement, training and attention.

- *The Deputy Minister and senior executives must ensure that mandated practices and rules are conducive to innovation and initiative among all staff engaged in the design, implementation and operation of I/T systems.*

- *In return, managers, systems professionals and users should be expected to be innovative and to use their initiative.*

6. Concern for People

The importance and requirements of effective human resource planning were discussed in Chapter II. But apart from business reasons, a ministry also has a moral responsibility to its people.

- *The Deputy Minister and Program Heads are responsible for informing staff of their plans, and preparing them to deal with job changes.*

- *Staff training and career development should be mandated ministry priorities, and a stated measure in evaluating the performance of all executives, managers and supervisors.*

7. Accountability for Results

The emphasis on decentralized management must be balanced by a clearly defined 'chain-of-command'. Responsibility for results must be explicit at all levels.

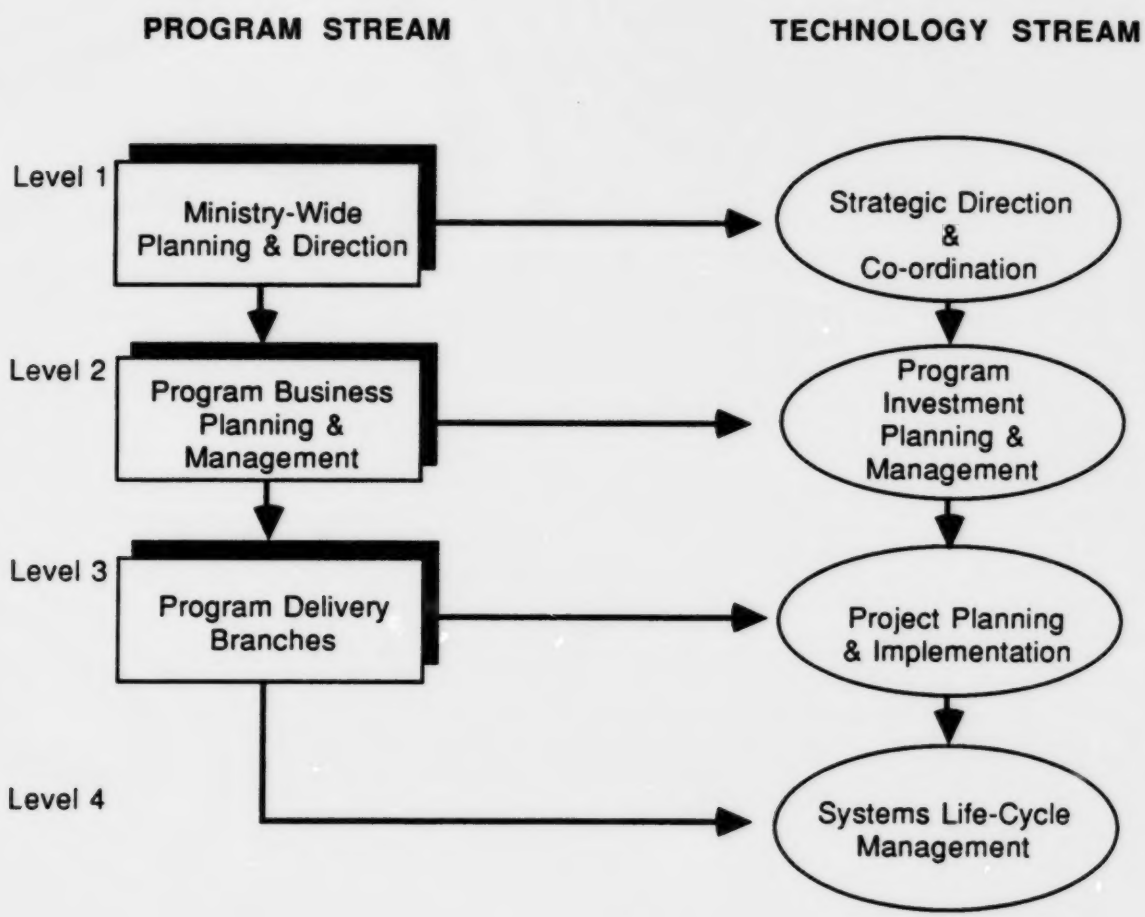
The Deputy Minister is accountable directly to the Premier, Minister and Management Board of Cabinet, as well as the Public Accounts Committee, for ensuring that scarce investment funds are used to increase the efficiency and effectiveness of the ministry's programs. This scrutiny is severe, with little tolerance for mistakes. The absolute imperative of fulfilling its contract with the Government must run with equal urgency throughout the ministry.

- *The Deputy Minister and Program Heads must make sure that everyone in the chain-of-command understands and is committed to the ministry's business objectives and technology targets.*

- *All participants in planning and using I/T systems will be held directly responsible for fulfilling their individual and group performance contracts.*

PART B: INTRODUCTION AND OVERVIEW

Diagram B:1 **INTEGRATION OF BUSINESS AND TECHNOLOGY PLANNING IN REVENUE**



PART B: INTRODUCTION AND OVERVIEW

In Part A we discussed, in general terms, what we believe are the essential principles and requirements of the successful use of technology. In Part B we shall describe their application in operational terms.

Our discussion will centre on a template for integrating business and technology decisions. Although our model is is based on the Ministry of Revenue's approach and practices we believe it is generally relevant to other ministries.

Diagram B:1 provides an initial summary of our model, of which the following features are noteworthy at this point:

- The three levels in the **Program Stream** represent the way ministries are typically organized for program administration and delivery purposes.

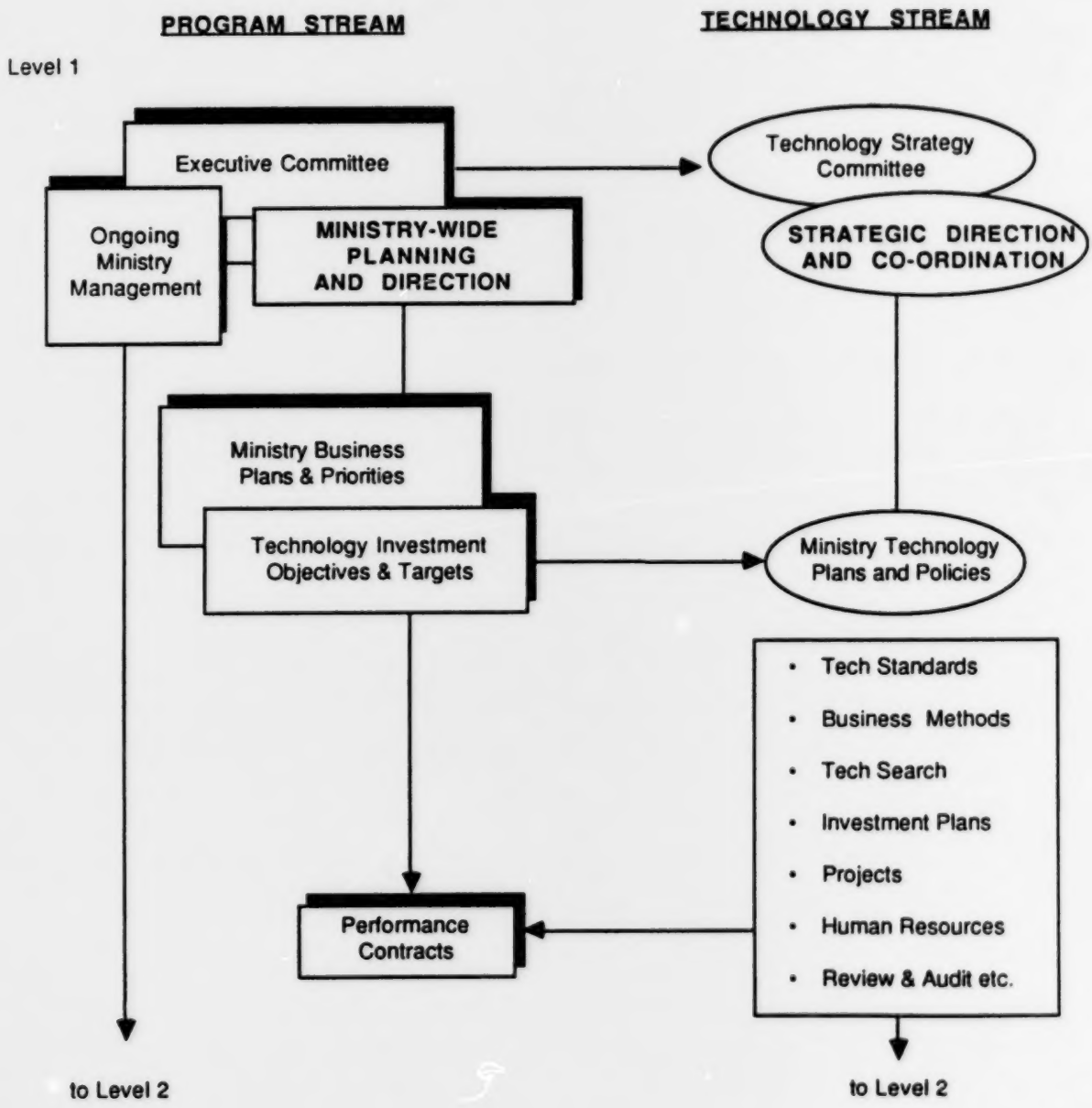
- The parallel **Technology Stream** represents the need for continuous strategic direction and tactical command throughout the investment and ongoing management sequence.

- The Program Stream is cross-linked to the Technology Stream to emphasize that, at all levels, I/T activities should be governed by and reconciled with business objectives.

- The two-column structure in the diagram is an obvious over-simplification of the organizational and functional diversity of ministries. For example, Revenue has four Program Groups, each comprising several operating and support branches. Each Program Group has its own Levels 2, 3 and 4 structure.

In the chapters in Part B we shall describe, in steps, the participants, responsibilities and practices associated with each level of the program and technology streams.

Diagram 4:1 STRATEGIC DIRECTION & CO-ORDINATION



CHAPTER IV: STRATEGIC DIRECTION AND CO-ORDINATION

In Part A we stressed the importance of continuous and forceful leadership by the Deputy Minister and Program Heads. In this chapter we shall examine, in greater detail, the organization and conduct of executive responsibilities at Level 1 in our summary model.

A. INTRODUCTION

Diagram 4:1 is intended to emphasize the importance of the Deputy Minister and senior executives ensuring that:

- short- and long-term Business Plans are developed for the Ministry and all Program Groups;
- clear business priorities and performance targets are established for all I/T plans and projects;
- continuous direction and support are given to all participants in investment planning and management;
- I/T planning, organization and practices are conducive to the exploitation of opportunities and ongoing performance of systems in a rigorous and businesslike manner;
- all plans and projects are approved and conducted according to prescribed Business Cases and performance contracts; and
- systems decisions and activities conform to Management Board and ministry policies, standards and rules.

In the Ministry of Revenue, direction of the Program and Technology Streams is exercised through two executive committees. This division has proven to be convenient and effective in managing the weight of our program business generally, and in ensuring close attention to the growing scale and complexity of our I/T operations in particular.

B. MINISTRY BUSINESS PLANNING AND DIRECTION

This section deals with the formulation of ministry-wide short and long-term business plans and program delivery targets, which, in turn, provide the basis for all 'top-down' I/T decisions and instructions.

1. Executive Committee

Composition: In common with most ministries, the overall direction of our Program Streams is provided by a conventional Executive Committee. This committee is chaired by the Deputy Minister and comprises:

- the Assistant Deputy Ministers of our Property Assessment and Tax Revenue and Grants Programs;
- Executive Directors of the Corporate Resources, Information Technology, and Tax System Operations and Design Divisions; and
- Directors of Finance and Priorities Planning, Legal Services, Personnel Services; and
- the Internal Auditor. [1]

The directors of product-line branches, the Communications Director, Employment Equity Manager and French Language Services Co-ordinator also attend regularly.

Functions: Revenue's Executive Committee deals with the usual mass of issues concerning priorities, administration and finance. As shown in Diagram 4:1, however, it is also expressly charged with two main responsibilities relating to our use of information technology.

2. Ministry Business Plans and Priorities

Under this heading the Executive Committee's primary function is to determine what has to be achieved in terms of program deliveries and

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1. The inclusion of the Internal Auditor in our Executive and Technology Strategy Committees is explained in Appendix B.

increased productivity, as a starting point for detailed planning throughout the ministry.

For this purpose, the committee establishes short and longer-term business priorities and targets generally across the Ministry. These are based on:

- forecasts of increased program workloads and complexity versus constrained resources as described in Chapter II;
- required improvements in customer services; and
- prospective and announced instructions to change existing programs or implement new ones.

Once established, these priorities and targets are transmitted as instructions to the various Program Management Committees to prepare comprehensive Program Business Plans (PBPs). In turn, these plans are reviewed by the Executive Committee, and incorporated into Revenue's overall business development strategy for 3-to-5 years.

When PBPs are mandated, the Executive Committee is responsible for:

- establishing financing plans, including the required submissions to Management Board; and
- monitoring the performance of PBPs, with ongoing revisions to fit policy changes and annual Estimates allocations (including in-year budget cuts).

3. Investment Objectives and Targets

At this point, the Executive Committee establishes, in general terms, the role of I/T in achieving the ministry's business goals. In particular, investment objectives and productivity targets are derived from approved PBPs, and are passed to our Technology Strategy Committee as the basis for developing detailed investment plans.

C. STRATEGIC DIRECTION AND CO-ORDINATION

The Technology Strategy Committee (TSC) is responsible for directing and co-ordinating new investments across the ministry, as well as the maintenance and enhancements of systems already in place.

1. Technology Strategy Committee

Revenue's Technology Strategy Committee (TSC) is also chaired by the Deputy Minister and includes the same members as the Executive Committee, with the addition of the Director of Revenue Operations and Research and Director of Assessment Data Services and Development. Typically, meetings are also attended by staff involved in particular decisions and projects.

2. Ministry Technology Policies and Plans

The specific responsibilities of the TSC include:

- **Priorities & Targets:** Setting detailed short and long-term investment targets throughout the ministry.
- **Technology Standards & Policies:** Establishing common Ministry standards and procedures concerning product selections, acquisitions and leasing, data security, systems changes, etc. (This includes ensuring participants understand Management Board rules).
- **Program Investment Plans:** Approving all Programs' 3-to-5 year plans, and annual project selections.
- **Business Case Methodology:** Legislating common practices and tests designed to ensure the business operating viability of all investment proposals.
- **Development & Maintenance Capacities:** Ensuring that Revenue's Information Technology Division (ITD) has the mandate and resources needed to support Programs' investment plans, and maintain existing systems.

- **Technology Search:** Making sure that the ITD is also equipped to identify and test potentially profitable new products and methods.

- **Project Business Cases:** Approving all major investment proposals and changes to installed systems, according to rigorous business criteria and technical tests. (Small projects may be delegated to the program level, and summarily reviewed by the TSC on a batch basis.)

- **Systems Life-Cycles:** Monitoring the performance of all systems and operating/maintenance costs against preset limits.

- **Ministry-Wide Systems:** Ensuring the viability of common I/T systems and facilities such as: on-site processors, data bases and networks, and office automation projects.

- **Human Resource Planning:** Establishing ministry-wide staff development policies and training facilities. Ensuring that all investment plans and project Business Cases contain staffing plans, and that Personnel Services and Employment Equity units can provide the full-range of required career counselling and training support.

- **External Services & Liaison:** Reviewing and approving all contracts for data processing and communications provided by the Ministry of Government Services and private-sector bureaux. Establishing connections with other ministries for mutual assistance and benefit.

- **External & Internal Accountability:** Directing all of Revenue's dealings with Management Board concerning investment approvals, finance and performance reporting. Ensuring that all I/T activity within the ministry is governed by performance contracts.

D. EXTERNAL & INTERNAL PERFORMANCE CONTRACTS

The importance of precise instructions and allocations of responsibilities throughout the chain-of-command was expressed by several of Revenue's Management Principles enunciated in Chapter III.

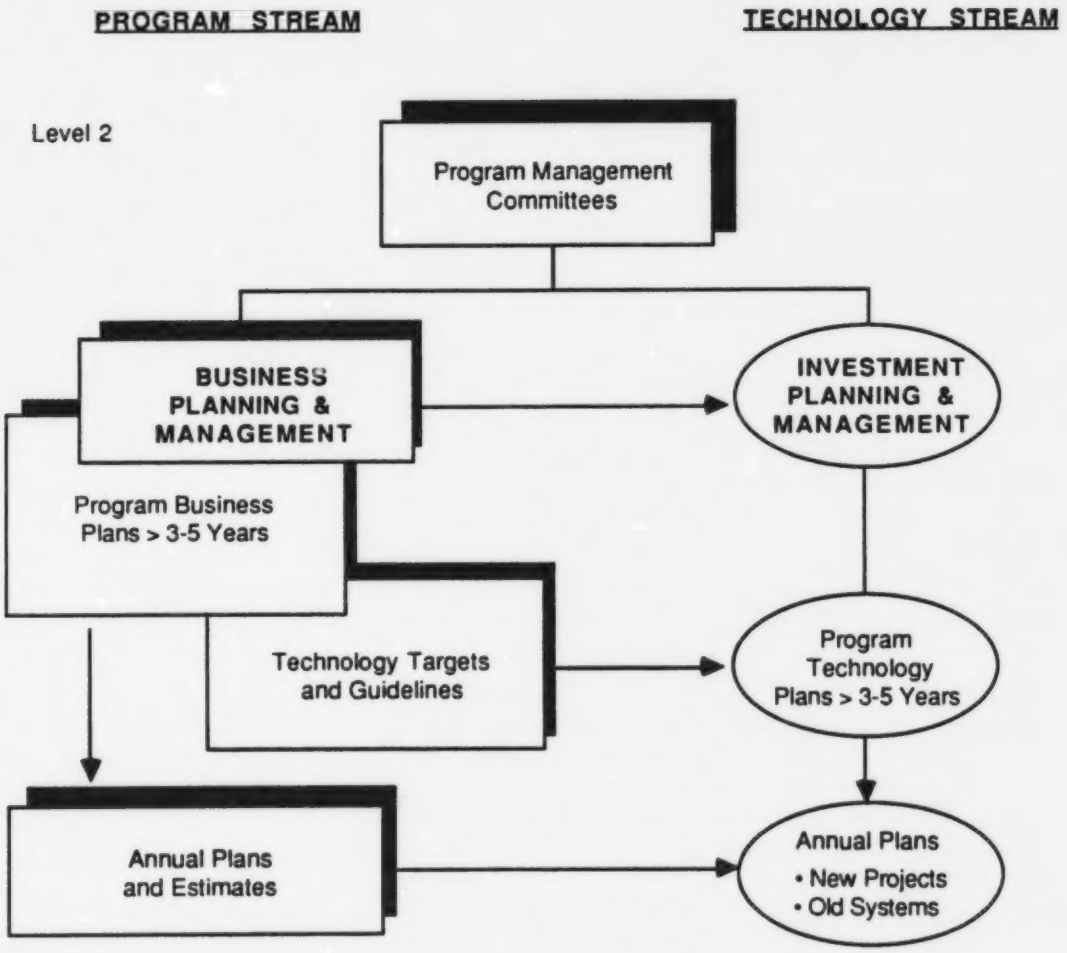
In Diagram 4:1, the translation of plans and targets into performance contracts is shown as an integral part of business and technology management in Revenue. Their purpose is to reinforce the cardinal rule that the Deputy Minister, Program Heads and Branch Directors are corporately and personally responsible for achieving stated results within exact budgetary limits, and according to Government and Ministry administrative standards. In effect, these contracts are summaries of the mass of decisions which determine Programs' and Branches' work agendas. They are in turn documented in numerous forms: such as, ministerial and Cabinet instructions; the Treasurer's Budget; Ministry Business Plans, and project Business Cases; and detailed Management-by-Results forecasts submitted annually to Management Board.

The Deputy Minister's accountability for a ministry's performance to the Minister, Management Board and Premier, etc., is well established and exercised in the Ontario public service. In 1987, however, this reality was strengthened by the introduction of formal annual 'Performance Agreements' for Deputy Ministers and Program Heads.

First, the Deputy Minister's performance agreement is a comprehensive statement of the ministry's business mandate and priorities, and exactly how it will achieve explicit performance targets on all program fronts. The agreement is reviewed and approved by the responsible Minister and Secretary of Cabinet on behalf of the Premier. Secondly, Program Heads' agreements are derived from the Deputy's 'master agreement', and are also submitted to Cabinet Office. An additional degree of imperative is added by the linking of annual salary increases for Deputies and senior executives to how well they fulfill their contracts.

Accountability is further reinforced by established Management Board processes for ministry resources allocations, and approving new programs and technology investments; as well as the introduction in 1988 of comprehensive Ministry Management Reviews by the Board.

Diagram 5:1 **PROGRAM PLANNING & MANAGEMENT**



CHAPTER V: PROGRAM-LEVEL PLANNING AND MANAGEMENT

The next step in the elaboration of our management model involves the development and application of I/T plans in support of Program Business Plans at Level 2. Diagram 5:1 identifies the Program Management Committees (PMCs) as the instruments for this work.

A. PROGRAM MANAGEMENT COMMITTEES

The purpose of Revenue's PMCs is to provide unified direction to each of our ministry's program groups, in line with the policies and directions established by the Deputy's Executive Committees.

Composition: The PMCs are chaired by their respective ADMs or Executive Directors, with the Directors of constituent branches as members.

The Executive Director of our Information Technology Division is also an ex officio member, and attends when PMCs are dealing with I/T questions. Similarly, the Director of Personnel Services and Employment Equity Manager participate for HRP purposes.

Functions: Essentially, PMCs replicate and combine the functions of the Level 1 executive committees. That is, they are responsible for co-ordinating all Program Stream and Technology Stream activities within their purview. Again, their objective is to ensure that all I/T decisions are derived from Program Business Plans and conform to ministry strategies and resource allocations.

Subsequent sections of this chapter will explain the:

- main functions of Revenue's PMCs; and
- mandated business practices which support their functions.

B. BUSINESS PLANNING AND MANAGEMENT

In the Program Stream each PMC is responsible for developing business plans (PBPs) and setting productivity targets for technology investments for its product-line branches.

1. Program Business Plans

At this point in Diagram 5:1, PBPs are general blueprints for improving the quantity and quality of program deliveries over 3-to-5 years, based on projected workload growth and complexity, customer service priorities and continued budgetary constraints.

The PBPs should cover all aspects of business development and be updated every year to reflect policy changes, resource allocations and market conditions.

2. Technology Targets and Guidelines

These targets and guidelines are derived from each Program's master Business Plan. As such, they constitute approvals, in principle, for the new investment over 3-to-5 years. They also govern the maintenance, enhancement or replacement of existing systems. They should also include plans for controlling downstream data processing and communications costs within preset limits, along with the supply of trained staff.

C. INVESTMENT PLANNING AND MANAGEMENT

In the Technology Stream of Diagram 5:1, our PMCs are expected to translate strategic technology targets into detailed operational form for implementation.

1. Technology Plans

These plans are comprehensive sets of specific projects to be undertaken over 3-to-5 years. Projects are selected and scheduled according to:

- the need to implement policy changes and new programs;

- delivery targets of established programs;
- size and complexity of projects, and sequential linkages;
- availablility of funds, risks, and payoff timing and rates; and
- availability of experienced project leaders and systems professionals.

2. Annual Plans

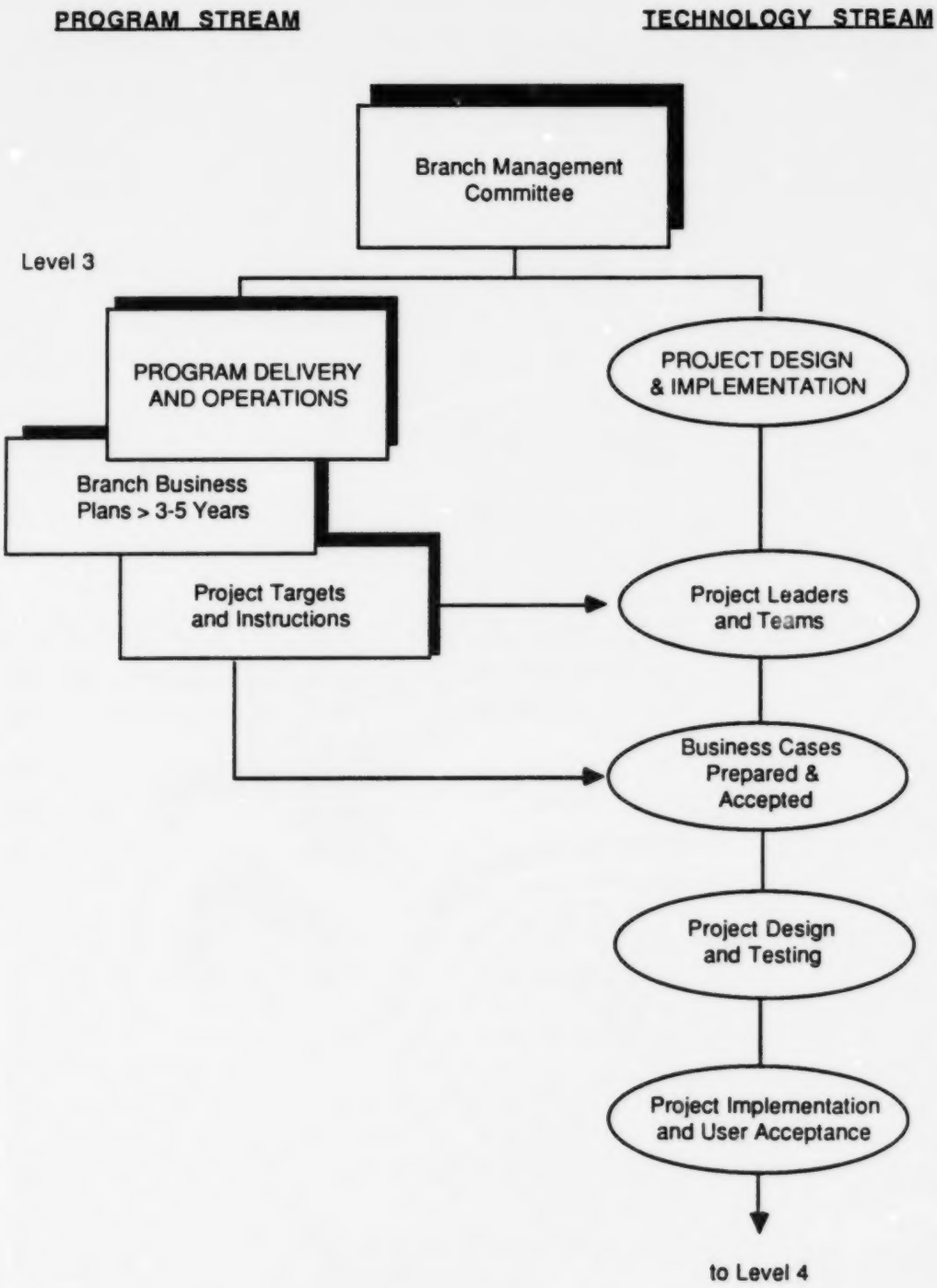
After executive approval of plans at Level 1, this stage entails the detailed preparation, co-ordination and costing of all new investment and enhancement/replacement projects which are scheduled in each Program for the upcoming fiscal year. This includes the:

- specification of output targets;
- allocation of funds and other resources;
- hardware and software, communications and processing costs;
- appointment of project leaders and teams; and
- selection and training of operating staff.

D. SUMMARY

ADMs and PMCs are responsible for ensuring that each Program is equipped with coherent plans for the development and management of its stock of I/T systems, and their consistency with explicit Business Plans. In line with the Management Principles enunciated in Chapter II, particular emphasis is placed on the exploitation of new opportunities, achievement of sustained productivity gains, leadership and staff development.

Diagram 6:1 **PROJECT DESIGN & IMPLEMENTATION**



CHAPTER VI: PROJECT DESIGN AND IMPLEMENTATION

In this chapter we deal with the translation of Ministry and Program priorities into specific investment projects at Level 3 of our summary model.

A. BRANCH MANAGEMENT COMMITTEES

The rationale and functions of Branch Management Committees (BMCs) are similar to the PMCs at Level 2, but concentrated on a narrower front with greater operational focus and emphasis on tactical flexibility.

Composition: In Revenue, each committee is chaired by the Director and comprises senior managers and other staff as required. As at Levels 1 and 2, it is important that the Information Technology Division is represented when BMCs are dealing with technology matters, as well as the Director of Personnel Services and the Employment Equity Manager for human resource issues.

Functions: BMCs are responsible for planning and co-ordinating all business-delivery and supporting I/T actions in their respective branches. This also involves establishing production linkages with other branches, and securing logistical and technical support services.

Diagram 6:1 describes the relationships between the program and technology activities of BMCs. Like at Levels 1 and 2, the central requirement is that all technology actions must be designed to achieve stated business objectives and productivity targets within explicit time and cost limits.

B. PRODUCT DELIVERY AND OPERATIONS

Under this heading in Diagram 6:1 BMCs are shown to be responsible for two main functions.

1. Branch Business Plans (BBPs)

These are detailed plans for improving a Branch's product deliveries and customer services incrementally on a 'rolling 1-3-5 year' basis.

These plans should cover all aspects of a Branch's operations and be reviewed and licensed by its PMC. The emphasis of these plans should be on efficient, flexible management of projected increases in workloads and complexity, and policy changes. They should be updated every year to accommodate changing market conditions, priorities and resource allocations. In particular, it is at this level that projects must be tactically modified (quickened or slowed) to accommodate unexpected program disturbances and budget cuts.

2. Project Targets and Instructions

I/T project targets are derived from the detailed short and long-term BBPs, and are translated into clear instructions to Project Leaders and Teams to commence the development, testing and implementation of specific projects.

These targets and instructions should cover both new investments and the repair, enhancement or replacement of existing system and the redeployment of affected operating staff in line with the Ministry's HRP principles and practices.[1]

C. PROJECT PLANNING AND IMPLEMENTATION

On the Technology Stream side, the translation of investment targets and instructions into viable projects involves four steps.

1. Project Leaders and Teams

Each Branch Director and the senior manager assigned by the Information Technology Division (ITD) is responsible for appointing Project Leaders and assembling Project Teams.

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1. See Appendix A for a detailed checklist of HRP functions of branches.

The selection of team leaders and members is obviously critical to success. They may be variously drawn from the ITD, user branch or elsewhere, according to the skill requirements of the project and availability of qualified staff. In short, each team must be custom made.

Also, the leadership and membership of a Project Team will not necessarily be constant throughout the life of a project. People may 'step on and off' to meet changing requirements at various stages in the design, testing and implementation sequence. This is particularly likely in multi-year, multi-stage projects where each stage has different business objectives, technical requirements and users.

The primary objective of the selection process should be to ensure the right balance and compatibility of systems staff and end-users. Project Leaders should be experienced in project management. They should also thoroughly understand the business objectives of the project and operations of the user-branch. Insofar as Project Teams work outside or separately from the user-branches, it is essential that Project Leaders maintain close liaison with Branch Directors to ensure that emerging systems are constantly checked to achieve the best possible operational fit.

2. Business Cases Prepared and Accepted

All new investments and significant changes to existing systems, should be governed by rigorous and formal Business Cases.

After the initial determination of their presumed viability, business-case submissions should be developed which provide Program and Branch management with the opportunity to evaluate projects before significant expenditures occur. Acceptance criteria should cover:

- the precision of stated business objectives;
- success measures, deliverables and payoffs;
- accuracy of operational analyses, problem delineation and proposed solutions;
- alternative ways of achieving the same objectives;
- analysis of the risks of proceeding and not proceeding;

- proofing and scheduling of required resources;
- specification of project teams, responsibilities and performance contracts;
- post-implementation operating and maintenance cost forecasts and control limits; and
- impact on human resources, including training needs and displacement problems to be resolved.

Whenever possible, business cases for all major project proposals should also be subjected to independent review and confirmation. [2]

Finally, it is assumed throughout that the completeness of business cases and the intensity of executive and independent reviews should be proportionate to the importance, size and complexity of each project. As we said in Chapter I, proposals should not be 'studied to death'.

3. Project Design and Testing

Once a business case has been reviewed and approved, the Project Leader is responsible for the detailed operational design, construction and testing of the I/T systems involved. Among the specific actions involved at this stage are:

- assigning and scheduling Project Team tasks;
- contracting programming and communications needs with the Information Technology Division;
- contracting systems consultants and specialists by ITD;
- specifying generic software and hardware requirements;
- application of Management Board and ministry acquisition rules;
- application of ministry data integrity and security standards;

2. The purpose and conduct of independent reviews are described in greater detail in Chapter VII.

- end-user job design and training requirements; and
- regular progress demonstrations to the BMC and PMC.

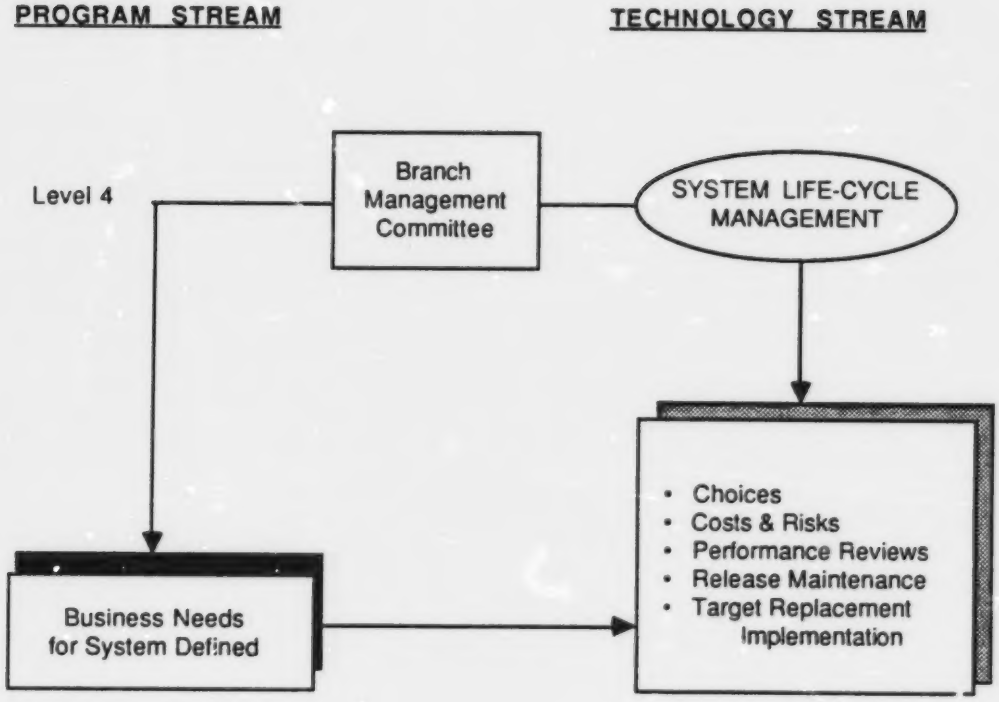
This stage is completed by the presentation of a Proposal-to-Proceed by the Branch Director and Project Leader for approval by the PMC, and ultimately the Deputy Minister's Technology Strategy Committee. This report should include confirmation of targeted results and required resources, as well as indentification of risks and contingency plans.

4. Project Implementation and User Acceptance

The final step involves the fulfillment of all project specifications as a condition for the acceptance of systems by the user branch as ready for operational use.

From this point on, new I/T systems will be subjected to ongoing production management, approved maintenance and post-implementation performance reviews.

Diagram 7:1 **LIFE-CYCLE MANAGEMENT**



CHAPTER VII: LIFE-CYCLE MANAGEMENT OF SYSTEMS

In Chapters IV to VI we were concerned with bringing new I/T systems into production. Whatever their initial success, however, systems do not run well for long without attention, nor do they last forever.

We briefly discussed the problem of increasing maintenance costs and obsolescence in Chapter II.

First, like all plant and equipment, I/T systems tend to deteriorate progressively as a function of overloading, wear and tear, and successive patchings. Secondly, it becomes increasingly difficult to adapt them to perform new tasks as business needs change. And thirdly, they are rendered obsolete as more efficient technology products and methods become available. As the competitive and operational viability of installed systems declines, sooner or later the ministry must decide whether to continue to repair them or invest in major enhancements or their replacement.

Diagram 7:1 illustrates Revenue's approach to managing installed systems.

A. DECISIONS AND CHOICES FOR SYSTEMS-IN-USE

Decisions to repair, enhance or replace existing systems are comparable in importance and complexity to those concerning new investments. Among the questions which must be answered are:

- How important is the system in competition with the need to build, repair or replace other systems?
- What is the urgency, in terms of break-down risks in not repairing or replacing the system? How long can it continue to operate efficiently at acceptable levels?
- What is the cost of enhancement versus replacement?

- Is it worth upgrading, in terms of the short run payoffs versus the need for continued maintenance?

- What are the cost, timing and technical implications of building a better system?

- Are sufficient funds and skilled staff resources available internally to undertake a major enhancement or replacement project? Can the system be replaced by purchasing a ready-made, commercial product?

B. RESPONSIBILITY

In the Ministry of Revenue, the operating branches are assigned the 'ownership' of their systems and they are therefore accountable for their ongoing performance and evaluation. From this vantage point, Branch Management Committees are expected to initiate proposals for major systems repairs, enhancements and replacements, which are then subjected to the same competitive scrutiny as new investments at Levels 1 and 2 in our summary model.

Of course, the primary requirement of the orderly management of installed systems is that their performance is regularly monitored, so that required changes can be planned and incorporated into overall Ministry and Program investment and financing plans. Sudden requests from branches to divert resources from other priorities to prevent imminent systems breakdowns are not regarded with favour.

C. ESSENTIAL BUSINESS PRACTICES

The following are some of the key elements of good business practice in the life-cycle management of existing systems.

- All systems should be subjected to scheduled performance reviews; for example, by Branch, ITD, or Internal Audit Branch staff, or consultants.

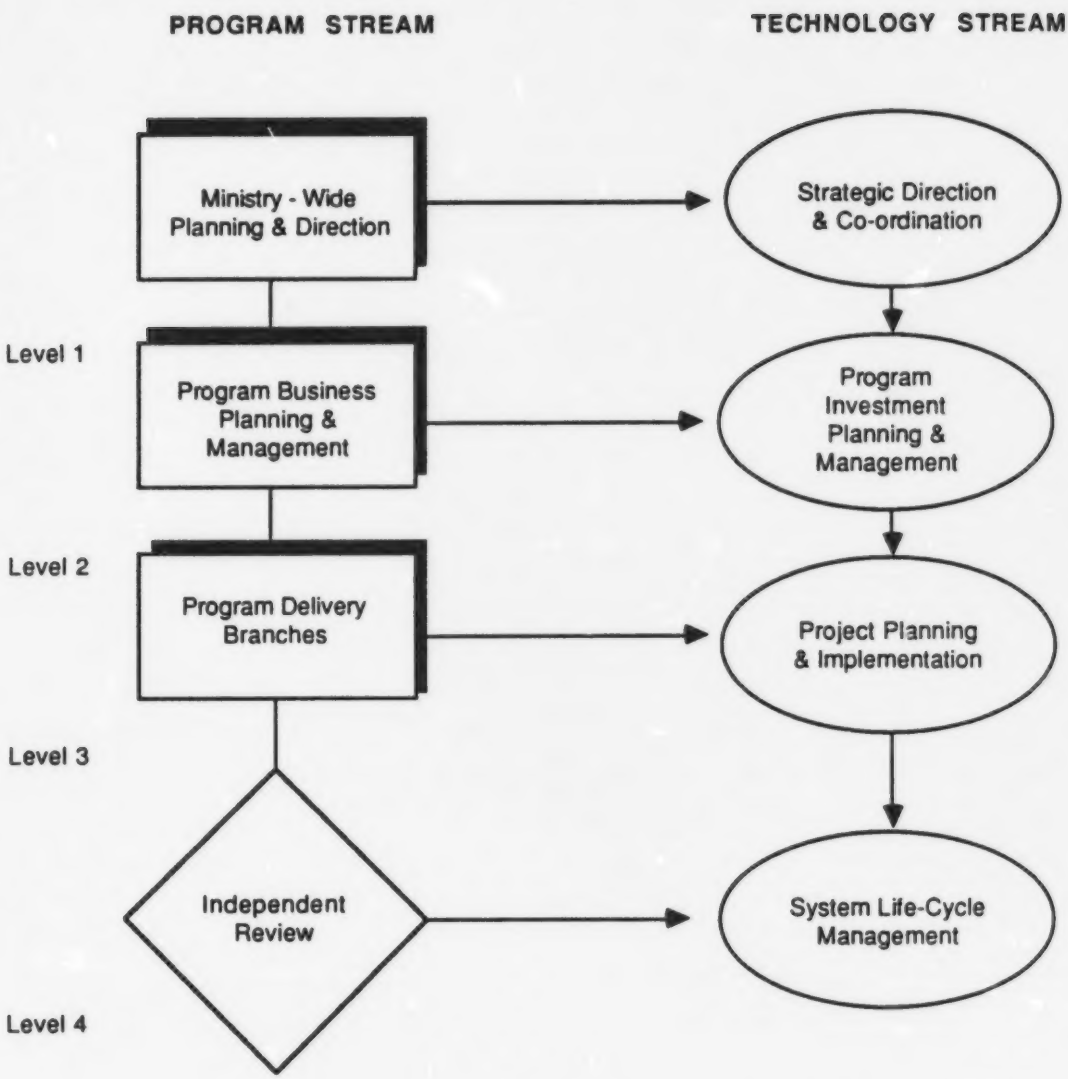
- Release Maintenance schedules and limits should be established as soon as possible after new systems have been successfully established and broken-in.

- The need to replace or significantly enhance installed systems should be identified, and the planning and implementation process begun, well in advance of targetted change-over dates.

In summary, depending on their scale and complexity, major systems repairs, enhancements and replacements should be subjected to the same rigorous Business Case and technical tests as new investments.

As we suggested in Chapter II, the importance of life-cycle management is accentuated by continuing budgetary constraints and the need to ration resources among competing demands. Overall, the control of increasing operating and maintenance costs of existing systems will likely be critically important to the ministry's ability to assemble scarce funds and skilled staff for the construction of new systems.

Diagram 8:1 INDEPENDENT REVIEWS



CHAPTER VIII: INDEPENDENT REVIEWS

In Part A we characterized a strategy of using information technology to radically change production methods as risky, costly and irreversible. Consequently, we stressed that all participants must be committed to success and fully accountable.

Thus far in Part B we have described how a ministry can bring its expertise to bear successively at the Executive, Program and Branch levels to ensure that investments meet stated business objectives with maximum effectiveness and efficiency.

In this last chapter, we briefly discuss the role of Independent Reviews, at Level 4 in our TPM model, as an additional means of proofing projects before they are finally approved for implementation. (Diagram 8:1)

A. PURPOSE OF INDEPENDENT REVIEWS

In the Ministry of Revenue, Independent Reviews (IRs) are an integral part of our TPM process. Their purpose is to provide an objective 'second look' to ensure that project Business Cases and implementation plans are well founded, truthful and operationally sound.

Composition: Independent Reviews of I/T proposals should be undertaken by groups working separately from Project Teams. Like Project Teams, IR teams should be selected according to the specific nature of projects. As well, IR groups may be changed as reviews proceed to include specialist staff for specific issues. Similarly, IRs can provide another means of training future project leaders and team members. In addition to technical skills, IRs require knowledge of ministry and Program investment strategies and business objectives. For this, it is important that IR teams also have direct access to senior executive committees and branch directors.

In practical terms, a ministry is unlikely to have sufficient resources and skilled staff to subject all of its projects to full-scale IRs. Equally, it is important that reviews should not result in unduly prolonging the approval of projects. For these reasons, IRs should be conducted expeditiously.

Recent projects subjected to IR in Revenue includes new I/T systems for the:

- Property Assessment Program;
- Ontario Tax Grants for Seniors;
- Financial Information Management System;
- Employee Share Ownership Program;
- Ontario Home Ownership Savings Program; and
- Revenue Computing Centre.

In Revenue's case, IRs are most often assigned to either our:

- Finance and Priorities Planning Branch; or
- Audit Services Branch.

These branches are used both because of their broad knowledge of our business objectives and operations, and their command of I/T issues, and because their directors report independently to the Deputy Minister and are members of the Executive and Technology Strategy Committee. Occasionally, however, external consultants are commissioned when internal staff are not available, or when it is necessary to assure Management Board that a project has been thoroughly proofed:

- an independent consultant was hired to proof the Business Case for the acquisition of Revenue's mainframe processor in 1987;[1]
- an independent technical expert reviewed the feasibility of distributing the Ontario Assessment System to regional assessment offices to run on a network of mini-computers.

Functions: Ideally, an IR team should undertake a 'top-to-bottom' examination of the Project Team's Business Case and implementation plan. It should include essentially the same acceptance criteria and tests as we described in Chapter VI.

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1. See Section C.

However, in addition to focusing on the business and operational viability of projects as self-contained ventures, IRs also provide a 'last-chance' opportunity to question their broader sense. For example:

- Where a large, expensive mainframe system is proposed: the IR team might raise the fundamental question of whether--in the light of now revealed costs, lead times and risks--it might be better to 'step back' and consider second-best but less expensive solutions.[2]

- Equally, where a project's objectives are low development costs and quick results, the IR team should ensure that explicit attention has been given to possible downstream consequences of higher operating and maintenance costs.

B. STRATEGIC NEW INVESTMENTS AND NEW TECHNOLOGY

We realize that the suggestion that all projects be subjected to full-scale IRs implies a duplication of costs which might be unnecessary if program/branch management committees and project teams have done their work properly. And certainly, the objective should be to 'get it right the first time around'.

However, we suggest that at least major investments--which fundamentally change production methods and staff requirements, and future technnology choices in strategic terms--should be examined rigorously.

C. REVENUE'S NEW COMPUTING CENTRE

The recent acquisition of our mainframe processor provides an example of the process by which the business and operational viability of strategic investments are established and proofed.

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2. Among such alternatives which might be considered to avoid the costs of major new systems are stretching or enhancing existing systems, buying or leasing commercial packages, or using staff to perform functions manually.

1. Establish Clear Objectives

The first step involved detailed analyses of Revenue's data processing requirements for the next five years with two main objectives.

Reduce Costs. Our projections of business-driven processing volumes (and exposure to increased bureau services) demonstrated an urgent need to contain the growth of costs, which predictably would be beyond our internal financial capacity or ability to obtain increased allocations from Management Board. Thus, our first objective was to find the means to stabilize costs within fixed and predictable limits for 4-to-5 years, which at least would prevent the diversion of funds from new investments and at best would actually generate savings to finance them.

Greater Control, Security, Accountability. External processing services are inevitably subject to competitive demands of other customers, as well as supplier's management decisions concerning capacity and delivery standards, etc. Our second objective, therefore, was to achieve greater security of supply of mainframe processing, particularly in ensuring that mainframe configurations are directly compatible with our strategies for end-user computing and distributed information systems and communications.

2. Identification of Options

During 1985 the ministry issued Requests for Information on alternative ways of meeting its data processing objectives. A detailed Business Case was presented in 1986 to our Technology Strategy Committee which identified three options:

- continue existing *shared computing* arrangements with three data centres;
- an *agency-managed computing facility* dedicated to the ministry; or
- establish a facility *owned and managed* by Revenue.

The third option was accepted by the Committee based on two criteria:

- reduced processing costs of approximately $5 million per year, which would provide funds for required investments and considerable savings to Management Board; and

- the ministry would be fully accountable for the cost, quality and reliability of its computing services and data security.

3. Independent Reviews

Two independent reviews were commissioned while preparing the submission to Management Board.

First, a consultant reviewed the ministry's Business Case in the light of mainframe computing trends in the U.S. and Canada, and to ensure it contained no flaws. (In fact, this report concluded that the ministry had understated the benefits of establishing its own facility.)

The second review was directed at formally sizing Revenue's data processing requirements, and confirming its ability to operate and manage its own on-site facility.

4. Tendering Process

Consequently, a request to call for tenders was submitted to Management Board and was approved in September 1986 to cover all options. This reflected the Board's concern that the tender process should be manifestly fair to all parties and conclusive in driving out the best solution at the best price.

The tender closed in December and was evaluated over an eight-week period by a team of ministry analysts and Management Board specialists. Finally, the decision was taken to recommend a ministry-owned and operated facility, along with the inclusion of a third-party facility manager to assist the ministry operations staff during the first two years of the four-year award. Also, the leasing contract for the processor included explict 'value-added' commitments by the supplier concerning the construction of the computing centre, installation of the processor, and its ongoing operation and enhancement.

5. Implementation and Results

The Revenue Computing Centre was constructed and the processor installed on time and under budget in Oshawa. All of the program applications were migrated successfully from external bureaux according to plan, without any major complications and with no disruptions of service, by September 1987.

Finally, in March 1988, a consulting firm was engaged to ensure that the Ministry's post-implementation performance report to Management Board conformed to accepted standards for evaluating the results of such investments in the private sector. Based on the first 12 months of operation, this report demonstrated that all of Revenue's original Business Case and operating commitments were met or exceeded. Altogether, the RCC will generate over $51 million in cost savings through to 1991.

PART C: APPENDICES

In Parts A and B we described the essential principles and core components of Revenue's approach to integrated business and technology planning and management.

Appendices A and B contain additional information on:

- Human Resource Planning responsibilities and functions, and the
- Expanded Role of the Internal Auditor.

Appendix C contains an updated inventory of Revenue's information technology assets and systems in 1988.

APPENDIX A: NOTES ON HUMAN RESOURCES PLANNING

The importance of Human Resources Planning (HRP) has been emphasized throughout this study. HRP was cited as our third foundation of successful technology planning and management in Chapter II. Also, in Chapter III we recommended that ministries should include explicit commitments to staff training and career development in their Statements of Management Principles.

These Notes are intended to demonstrate the workings of a co-ordinated approach to HRP. For this purpose:

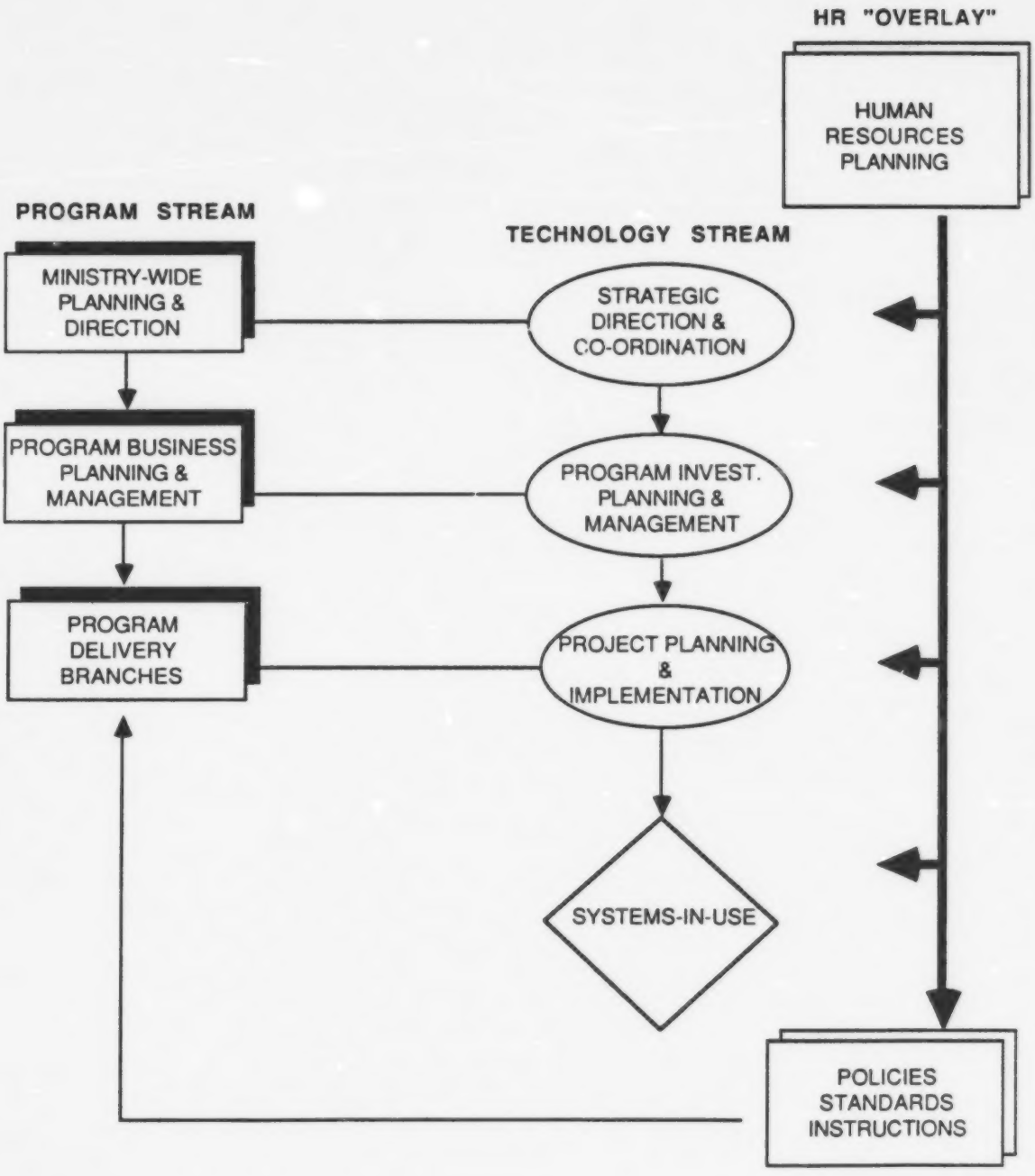
- Section I summarizes the main components of HRP; and
- Sections II to IV provide check-lists of functions attached to the three Levels of technology planning and management.

I. KEY COMPONENTS OF HRP

The following is a consolidated summary of the key components of HRP which were variously recognized and discussed in preceeding chapters:

- **Ministry Principles and Policies**, which express the ministry's commitment to staff protection, training and career development in the process of technological change. (Chapter III:6)
- **Staff Forecasts and Plans**, which detail the impact of I/T on staff, as mandatory parts of all plans and projects. (Chapter II:C1)
- **Training Facilities and Mandates**, which ensure that staff are provided with the support they need to deal with and benefit from job changes, and which delineate the roles and responsibilities of executives and managers for staff training and development. (Chapter II:C3)

Diagram 9:1 INTEGRATED HUMAN RESOURCES PLANNING



- **Job Classification and Rewards Policies**, which ensure that the impact of technology on jobs is recognized, and staff are rewarded for increased skills, responsibilities and productivity. (Chapter II:C3 and Chapter III:7)

- **Working Conditions Standards,** which encompass workstation planning, air quality and heat controls, and job planning to avoid machine-stress. (Chapter II: C2)

- **Management Accountability**, which makes managers and supervisors directly responsible for training and developing their staff. (Chapter II:C4 & Chapter III:7)

- **Effective Communications**, which ensure that staff are informed of investment plans and projects, and can participate in managing their impact. (Chapter III:3)

The following Sections summarize how these requirements are met at each of the three Levels of our model. (Diagram 9:1)

II. AT THE STRATEGIC LEVEL

The DM's Executive and Technology Strategy Committees are responsible for establishing coherent HRP principles, practices and standards, and overseeing their observance at Levels 2 and 3.

As we stressed in Chapters II to IV, the overriding objective is to ensure that:

- all I/T investments are supported by trained staff; and

- the ministry's staff are given maximum assistance to deal with, and benefit from technological change.

The following is a check-list of specific functions.

a. HRP Principles, Practices & Mandates

- Legislate the Ministry Statement of Management Principles.

- Legislate ministry technology training and career development policies, practices and procedures.

- Establish the primary responsibilities of Program Heads, Branch Directors and Project Leaders for staff training and career development.

- Mandate the roles of Information Technology Division (ITD), and the Personnnel Services Branch (PSB), including the Employment Equity Program (EEP).[1]

b. Ministry HRP Actions or Components:

- Establish 3-to-5 year strategies and staff training targets, derived from Program Business and Technology Plans, and project schedules.

- Establish ministry funding requirements and Program allocations.

- Provide funds and resources to the PSB, ITD and EEP for corporate HRP services.

- Assess the need for corporate training facilities and direct their construction: such as Revenue's Technology Demonstration and Training Centre.

- Establish a comprehensive ministry Performance Management/Career Development system, as the basis for staff counselling, training selections and advancement.

- Ensure job classifications and salaries recognize technology skills, responsibilities and performance.

- Establish workplace environmental standards.

- Ensure staff are informed of job changes, training requirements and opportunities associated with prospective and approved investment plans and projects.

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1. See Section VI

c. HRP Instructions & Approvals:

- Review and approve all Program plans, actions and targets.
- Monitor actual performance of Program investment plans and Branch major projects; and approve all resets.

III. AT THE PROGRAM LEVEL

Program Heads and their Management Committees are accountable for the application of the ministry's HRP principles, policies and standards in planning and implementing all I/T actions. The objective is to ensure that scarce staff resources are trained, developed and deployed with maximum effectiveness to support the full range of the Program's business activities and I/T systems.

The following is a check-list of specific functions.

a. HR Planning:

- Construct HRPs to support 3-to-5 year Program Business and Investment Plans, including the specification of Program-wide productivity targets.
- Establish Program HRP funding requirements and branch allocations.
- Set staff training/development targets and schedules.
- Identify Program hiring requirements and standards.
- Establish Program-wide job planning and reclassification needs.
- Endorse and disseminate ministry workplace standards.
- Direct and fund new technology prototypes, such as Office Automation, laptops, expert systems.
- Ensure Branch Directors, managers and project staff understand Ministry HRP objectives; and their roles and accountability.
- Direct staff communications on I/T plans and projects.

b. Approvals & Instructions:

- Review and approve HRP actions in all Level 3 plans and projects.
- Ensure application of ministry HRP principles, standards and practices in specific projects.
- Monitor HRP performance, and results of all Program and Branch plans and projects.

IV. AT THE PROJECT LEVEL

This is the locus of the greatest effort and attention to HRP in operational terms. Just as Branch Directors and senior managers are expected to understand their business needs and I/T systems, they are also expected to know their people as individuals.

The objective at this Level is to make sure that all new projects and changes to existing systems are fitted with precise HRP actions, with close attention to people's skills, potential and aspirations.

- Ensure managers and supervisors understand and apply ministry HRP principles, practices & standards.
- Administer the ministry's Performance Management/Career Planning process.
- Establish and administer job counselling, training and rotation schedules.
- Establish effective liaison and contracts with the PSB, ITD and EEP for staff counselling and training.
- Administer ministry workplace policies and standards, and ensure staff participation.
- Administer staff recruitment and promotions.
- Ensure staff aware of planned I/T projects, and related job changes and opportunities, and ensure staff participation.

- Include HRP needs in Branch Estimates & Project funding.
- Ensure that all Project plans include explicit HRP targets and training schedules.
- Ensure that all Project Leaders and Members understand the HRP objectives of their projects.
- Ensure that all staff are informed of project needs & implications.
- Ensure that all Projects are implemented to achieve human resources objectives.

V. SYSTEMS-IN-USE

It is assumed throughout that changes to installed systems are subjected to the same HRP principles and tests as new investments. In addition, where no changes are planned, attention should be given to identifying opportunities for retraining and redeploying staff to new projects to the mutual advantage of the ministry and staff.

VI. STAFF TRAINING AND SUPPORT MANDATES

As already noted, in the Ministry of Revenue the Personnel Services Branch and Information Technology Division are designated as the central 'suppliers' of training and support services to I/T end-users. For this reason, they are jointly responsible for the operation of our new Technology Demonstration and Training Centre in Oshawa. The reader is referred to Study 2 for a discussion of our approach to providing the skilled staff needed to support a strategy of diversified and accelerated investments in end-user computing technology.

APPENDIX B: PROACTIVE ROLE OF INTERNAL AUDIT

> *"In the Ministry of Revenue, the Internal Auditor is expected to contribute to making good investment decisions. The objective is to make new systems work right the first time out. If the Internal Auditor has something to say about how to make good decisions we need to know when we're making them. Not afterwards".* [1]

In Chapter IV we noted that Revenue's Internal Auditor (IA) is a full member of the Deputy Minister's Executive and Technology Strategy Committees. Also, in Chapter VIII we cited the Internal Audit Branch (IAB) as a candidate for undertaking or contributing staff to Independent Reviews.

These notes elaborate on the direct role we have assigned to the IA in technology planning and management in three stages:

- Section I deals with the rationale of the IA's participation;
- Section II provides a check-list of functions at each of the three Levels of our model.

I. REASONS FOR THE IA'S EXPANDED ROLE

Traditionally in the Ontario government, Internal Auditors have been mainly concerned with their ministries' compliance with administrative rules established by Management Board, Treasury and the Civil Service Commission. As 'designated watchdogs', IAs typically conduct post-audits of selected programs and present their findings and recommendations for corrective actions to their Deputy Ministers.[2] The essential feature of this role is that

1. Terry Russell, Speech to the Canadian Conference on Auditing and Computer Technology, Toronto, October 1986
2. Insofar as these rules are also the focus of attention by the Provincial Auditor, IAs' reports also warn ministries of the need to correct infractions and thereby avoid criticism in the Provincial Auditor's Annual Reports to the Public Accounts Committee of the Legislature.

IAs purposely operate independently or aside from ministries' decision-making processes in order to preserve their objectivity.

It is commonly recognized, however, that observed compliance with administrative rules is at best a limited proxy measure, or assurance, of a ministry's success in achieving the best possible economy, efficiency and effectiveness in its program deliveries. More importantly, while these rules are useful in running established programs under static conditions, they say little about how programs should be changed or new ones designed to meet new needs under uncertain conditions.

Considerable attention has been given in recent years to making the internal audit function more relevant to the broader objectives and realities of public administration. In particular, the development of 'Comprehensive Management Auditing' (CMA) and/or 'Value-for-Money Auditing' (VMA) is variously intended to assist in strengthening management skills, decision-making processes and accountability. Their use in the Canadian public sector was led by the federal Auditor General in 1978 and followed by expanded mandates for Provincial Auditors. Also, since 1980 the Canadian Comprehensive Auditing Foundation has done much to develop a consistent body of concepts and practices through numerous publications and conferences.[3]

In the early 1980s, Revenue's IA was instructed to develop a capacity for CMA/VMA. At the same time, he was explicitly assigned a direct role in our business and technology planning processes. The basic reason for this was our belief that our IA should be not be confined to judging past decisions and the effectiveness of established operations, but rather, should be involved 'up front' in helping us to make the best possible decisions which affect future operations.

To this end, the IA's participation in the Deputy Minister's Executive and Technology Strategy Committees is designed to provide him with direct responsibility for ensuring that:

- the principles, methods and tests of 'good management' auditing are built into our policies and practices;

- his management expertise and business knowledge are used when they are most needed: when we are evaluating options

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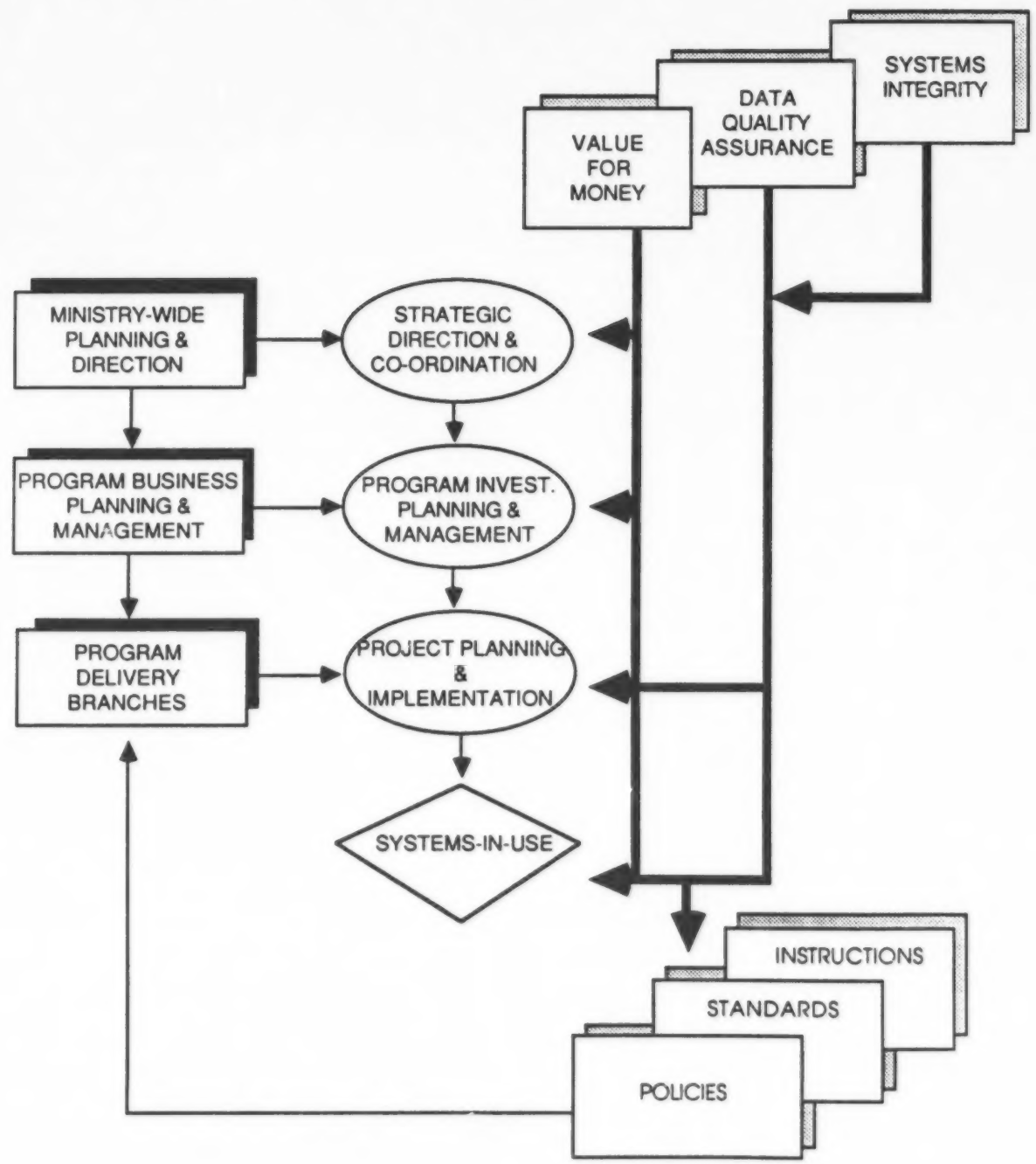
3. For example, see the Foundation's Comprehensive Auditing: Concepts, Components & Characteristics (1983) and subsequent publications. See bibliography.

Diagram 10:1 **INTERNAL AUDIT FUNCTIONS**



and risks, and committing resources to investment projects in the face of uncertain future conditions and requirements; and

- his staff are used as appropriate in project teams and independent reviews to test new applications before they are 'switched on'.

In addition to his direct involvement in our investment practices and decisions, Revenue's IA has been assigned particular responsibilities in the area of data quality assurance, integrity and security. [4]

II. RESPONSIBILITIES AND FUNCTIONS

This Section provides a checklist of the IA's functions at each level of our model. (Diagram 10:1)

It is assumed throughout that the IA also maintains a full schedule of conventional financial and administrative audits, as described in Section I and required by Management Board.

AT THE STRATEGIC LEVEL

In line with the objective of using the IA's expertise in proofing our business and investment decisions, the IA is expected to participate directly in the following areas:

- establishing rigorous planning and business-case
- reviewing and approving business plans and investment strategies;
- arranging internal auditors' participation in investment projects;
- conducting or participating in Independent Reviews as directed; and

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4. See Maija Svanks, "Integrity Analysis: A Methodology for EDP Audit and Data Quality Assurance" (Ministry of Revenue: published by the EDP Auditor's Foundation Inc., 1984)

- establishing methods and criteria for Data Quality Assurance and Systems Integrity Audits.

AT THE PROGRAM LEVEL

As an extension of his participation in Level A strategic decisions, the IA is expected to maintain close liaison with Program Heads with a primary emphasis on deploying audit staff to:

- assist in preparing Program Business and Investment Plans being submitted for executive approval at Level I;
- participate in project design and implementation teams;
- conduct post-implementation performance audits; and
- debrief Program Heads on compliance audits, and assist in corrective actions.

AT THE BRANCH/PROJECT LEVEL

This is the locus for the IAB's working participation and staff deployment in proofing projects. For this purpose, the IA or his designated 'case manager' are expected to maintain close liaison with Branch Directors and Project Team Leaders. This involves particular emphasis on ensuring that:

- Project Business Cases and schedules conform with mandated ministry policies and 'best practices', and are fitted with rigorous performance targets and measures;
- audit staff are assigned, where required, to participate in project and/or independent review teams;
- audit requirements for Data Quality Assurance and Systems Integrity reviews and tests are met; and

- the IA is provided with access for scheduled post-implementation performance reviews of new systems and enhanced old systems.

As we noted in our discussion of Independent Reviews in Chapter VIII, it is unlikely that the Internal Auditor will have the resources necessary to fully participate in the detailed design, testing and implementation of all projects. Consequently, in Revenue they are assigned selectively according to two criteria:

- the strategic importance of projects, particularly in supporting new programs and/or achieving major productivity targets; and

- the demonstrated track record of branches in implementing projects, on time and within budgets, to achieve planned results.

Finally, the overriding purpose of the IA's involvement, throughout the planning sequence, is to assist in building strong Business Cases and ensuring successful implementations. This requires that the IA gain the acceptance of Branch management and Project Leaders by demonstrating that their objective is to be helpful rather than critical. It also requires that the IA and his staff are subject to the same discipline of accountability as the other participants.

APPENDIX C: MINISTRY OF REVENUE TECHNOLOGY INVENTORY
October 1988

- **RESOURCES**

Direct I/T Expenditures (Production, Maintenance)	$19.5 Million
Telecommunications Budget	$ 5.3 Million
Total MIS Staff	193
Permanent	156
Contract	37
Data Services Suppliers	3
Government Data Centres	2
Private Data Centres	1

- **WORKLOAD**

Production Systems	25
On-Line Enquiry/Batch Update	18
On-Line Enquiry/Real Time Update	4
Paper Based/Batch Update	3
Expert System Prototypes	2

- **REVENUE COMPUTING CENTRE**

Production Processor IBM 3090/180E	21.0 MIPS
Development Processor IBM 4381	2.7 MIPS
Combined Storage	
Disk Drives	95.0 GBytes
Main Memory	89.0 MBytes
IBM 3800-3 Laser Printer	1
High Speed Impact Printers	3

- **END-USER EQUIPMENT/NEW TECHNOLOGIES**

Laptop Computers	385
PCs	715
Minis	3
Word Processors	52
SL1/9 Voice/Data Switch (Head Office)	1
Full Motion Video Teleconferencing Studios	3
Executive Workstations on Communications Network	176
Employee Workstations Designed Specifically to Accommodate Technology	1,200
Terminals	1,455
Head Office (3270 Terminals)	516
Field Offices (3270 Terminals)	832
POSO (Banking Terminals)	107

- **PENETRATION RATES**

'Knowledge Workers' per PC	
Head Office	1.1:1
Field Office	8:1
Clerical Employees per On-Line Terminal	1:1

- **PROGRAMMING TOOLS/AIDS**

IMS	FOCUS
TELON	DB2

TECHNOLOGY DEMONSTRATION & TRAINING CENTRE
January 1986 - October 1988

Technology Showcase

• Hardward Products Demonstrated	104
• Software Products Demonstrated	40
• Number of Showcase Visitors	2,884

Walk-In Services

• Workstations Available	5
• Portable Devices for Loaner Program	14

Training Centre

• Training Classrooms	2
• Microcomputers Available	12
• VCRs for Video Based Training	3
• Number of Participants in Classroom Training	4,602
• Number of Users of Guided Learning Unit	2,320